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(71) Applicant: **ICHIKOH IND LTD**

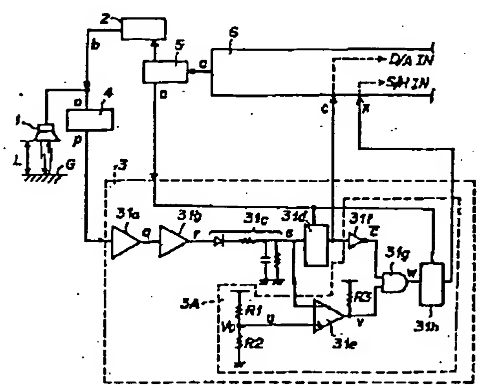
(72) Inventor: **KONUKI ISAO**

(54) HEADLAMP OPTICAL AXIS REGULATING DEVICE FOR AUTOMOBILE

(57) Abstract:

PURPOSE: To maintain proper regulation of an optical axis angle even when the intensity of a reflection wave is temporarily decreased up to weak value by a method wherein the angle of an automobile with a road is computed by using an arrival time of a reflection wave right before the under-mentioned time at an ultrasonic sensor at a time when a reflection wave detected by the ultrasonic sensor is decreased to a value not higher than set intensity.

CONSTITUTION: A signal holding circuit 3A is added to a receiving circuit 3 and when a receiving signal (p) is decreased to a value lower than set intensity, a control circuit 6 is operated so that the level of an ultrasonic emission signal (e) right therebefore is held. Namely, when a receipt signal (p) (a rectifying output signal (s)) is decreased to a value lower than a constant voltage Vo, an output signal (v) from a comparator 31e is increased to an H-level and output signals (w) from an inverter 31f and an AND circuit 31g are at a H-level. A flip flop circuit 31h inputs a selection signal (x) for hold when an signal (w) is at an H-level, and a selection signal (x) for a sample to the sample hold circuit for a control circuit 6. As a result, even when a receipt signal (p) is weak, the level of the signal (e) right therebefore is held.



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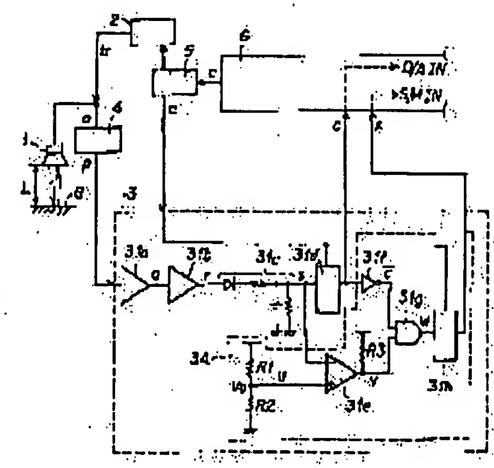

circuit for a control circuit 6. As a result, even when a receipt signal (p) is weak, the level of the signal (e) right therebefore is held.

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JAPANESE [JP,09-002148,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] While firing a predetermined pulse-like supersonic wave from the ultrasonic sensor which countered the road surface and was respectively formed in the before [an automobile] and back end section side, each ultrasonic sensor detects the reflected wave respectively for every ultrasonic discharge. In an optical-axis adjusting device an include angle [as opposed to the road surface of said automobile based on each time of concentration to each ultrasonic sensor of each of that reflected wave] -- calculating -- the result of an operation -- responding -- the headlight of said automobile -- the object for automobiles which controls whenever [optical axial angle] and obtains whenever [proper optical axial angle] -- a headlight -- When the reflected wave detected with said ultrasonic sensor becomes below the reinforcement set up beforehand the object for automobiles characterized by providing the signal holding circuit to which an include-angle operation of as opposed to the road surface of said automobile as the reflected wave according the reflected wave by the ultrasonic discharge in front of that to the ultrasonic discharge in that case is made to perform using the time of concentration to the ultrasonic sensor of Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. -- a headlight -- an optical-axis adjusting device.
[Claim 2] The ultrasonic sensor which countered the road surface and was respectively formed in the before [an automobile] and back end section side, The sending circuit which fires a predetermined pulse-like supersonic wave from each ultrasonic sensor, The receiving circuit which outputs respectively the distance signal with which the input signal by each ultrasonic sensor is orthopedically amplified and operated, and time amount width of face changes from each ultrasonic sensor according to the distance to a road surface for every supersonic-wave discharge from each ultrasonic sensor, The timing circuit which drives said sending circuit so that a pulse-like supersonic wave may be respectively fired from each ultrasonic sensor by the transmit frequencies and the air time which started by the trigger pulse and were set up beforehand, the headlight which controls whenever [optical axial angle / of the headlight of said automobile] -- an optical-axis driving means and this headlight -- with the position sensor which detects the location of a control output shaft whenever [optical axial angle / of an optical-axis driving means] In response to each distance signal from said receiving circuit, change and memorize the time amount width of face to digital value or an analog value for every supersonic-wave discharge from each ultrasonic sensor, and a false continuous ringing is acquired respectively. While calculating the include angle to the road surface of said automobile with the value in the predetermined time of each false continuous ringing In an optical-axis adjusting device the time of distinguishing whether whenever [optical axial angle] is proper, and not being whenever [proper optical axial angle] in this result of an operation and the detecting signal from said position sensor, -- said headlight -- the object for automobiles which comes to have the control circuit which drives an optical-axis driving means, controls whenever [optical axial angle], and obtains whenever [proper optical axial angle] -- a headlight -- Said receiving circuit So that the

value of said false continuous ringing by the ultrasonic discharge in front of that may be held as a value of the false continuous ringing by the ultrasonic discharge in that case and it may control whenever [said operation and optical axial angle], when said input signal becomes below the reinforcement set up beforehand the object for automobiles characterized by providing the signal holding circuit which operates a control circuit -- a headlight -- an optical-axis adjusting device.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] the object for automobiles using the range measurement according [this invention] to a supersonic wave -- a headlight -- it is related with amelioration of an optical-axis adjusting device.
[0002]
[Description of the Prior Art] The include angle to the road surface of an automobile changes in connection with the manpower which takes the automobile, amount or those distribution conditions of the load to load, etc., and, thereby, the optical axis of a headlight also changes. This of not knowing being carried out, and the oncoming car being dazzled with the headlight of a self-vehicle, or it meaning that a headlight may be suitable too much caudad, therefore being able to carry out regulating automatically of the optical axis of a headlight proper is very useful to safety reservation of a self-vehicle and an oncoming car.
[0003] then, the object for automobiles which carries out regulating automatically of the optical axis of a headlight -- a headlight -- although the optical-axis adjusting device is invented variously, as an approach of asking for the include angle to the road surface of an automobile, i.e., the inclination of the optical axis of a headlight, in this case, a distance robot is prepared before an automobile and in the back end section, distance with a road surface is measured in each part, and there is a method of asking for an inclination based on those values. By this approach, the echo from the road surface of the medium for measurement discharged from the predetermined location of before an automobile and the back end section (transmission) is usually detected, and range measurement is performed. Although there is light, an electric wave, or a supersonic wave as a medium used for range measurement, it is difficult light on actual for range measurement to become impossible with the dirt of a luminescence side or a light-receiving side, or to assume a road surface to be a light reflex side, and an electric wave is [incorrect-] easy to be measured in response to the effect of external noise. From this, a supersonic wave is suitable and carries out range measurement using a supersonic wave actually, it asks for the inclination of the optical axis of a headlight, and some techniques which carry out optical-axis adjustment are considered.
[0004] Drawing 3 is the block diagram showing the example. The ultrasonic sensor with which 1 consists of an ultrasonic vibrator of the object for transmission, and the couple for reception etc. in this drawing 3 , The sending circuit which 2 gives [sending circuit] the pulse-like high-tension signal b to an ultrasonic sensor 1, and fires a predetermined pulse-like supersonic wave from the ultrasonic sensor 1 (transmission), The receiving circuit which amplifies and operates orthopedically the signal by which 3 was received with the ultrasonic sensor 1, and 4 are the selection circuitries for being

prepared between an ultrasonic sensor 1 and a receiving circuit 3, and not telling the signal b from a sending circuit 2 to a receiving circuit 3. 5 is a timing circuit and 6 is a control circuit. Here, a timing circuit 5 sets up the transmit frequencies f and the air time tau of a supersonic wave, is started by pulse signal (trigger pulse) a from a control circuit 6, and drives a sending circuit 2, and transmits pulse signal a from a control circuit 6 to a receiving circuit 3. A control circuit 6 calculates by considering the signal c from a receiving circuit 3, and the signal Vs from the below-mentioned position sensor as an input, and according to the result of an operation, Signal a is outputted to a timing circuit 5, and it outputs Signal g to the below-mentioned actuation circuit respectively. 7 -- the signal g from a control circuit 6 -- a headlight -- the actuation circuit for driving the optical-axis driving gear 9, and 8 -- a headlight -- it is the position sensor which detects the location of the output shaft of the optical-axis driving gear 9, and returns the detecting signal Vs to a control circuit 6.

[0005] Here, although said sending circuit 2, a receiving circuit 3, a selection circuitry 4, and a timing circuit 5 constitute the ultrasonic transceiver circuit 11, one pair of of this ultrasonic transceiver circuit 11 and said ultrasonic sensor 1 is prepared respectively, among those, the object for the front end sections of an automobile (not shown) and others are the same, and 1 set (what has given subscript R to the sign) of 1 set (what has given subscript F to the sign) is an object for the back end sections. It is attached in the condition that ultrasonic sensor 1R for the back end sections made ultrasonic sensor 1F for the front end sections counter a road surface G respectively at the automobile back end section, for example, the after bumper lower part, at the automobile front end section, for example, the before bumper lower part.

[0006] such an object for automobiles -- a headlight -- in an optical-axis adjusting device, a control circuit 6 outputs pulse signal a (aF, aR) which takes the timing of ultrasonic transmission and reception, and starts a timing circuit 5 (5F, 5R). A sending circuit 2 (2F, 2R) generates the high-tension signal b (bF, bR) which excites fixed time amount tau and an ultrasonic sensor 1 (1F, 1R) synchronizing with the start of pulse signal a. The vibration frequency f to excite is arbitrary.

[0007] It is reflected on a road surface G and the supersonic wave discharged from the ultrasonic sensor 1 returns to an ultrasonic sensor 1 again after T seconds. The input signal o (oF, oR) passes a selection circuitry 4 (4F, 4R), and reaches a receiving circuit 3 (3F, 3R). In addition, as for the high-tension signal b to a sending circuit 2, the enter lump by the receiving circuit 3 is prevented by this selection circuitry 4. Magnification / plastic surgery processing is carried out in a receiving circuit 3, and the input signal p (pF, pR) which arrived at the receiving circuit 3 is outputted as a distance signal c (cF, cR) with which the time amount width of face T changes according to distance L (LF, LR), and is sent to a control circuit 6. The time relation of Signals a, b, and c in this case is as being shown in drawing 4 a, b, and c.

[0008] A control circuit 6 receives the distance signal c sent from a receiving circuit 3, and changes it into the digital value or the analog value according to the width of face T. Although a conversion result is memorized in memory or a sample hold circuit, it shall change into an analog value here and shall memorize in a sample hold circuit. That is, a D/A conversion count which changes a voltage level with the width of face T of the distance signal c is performed here (refer to drawing 4 D/A OUT). Drawing 4 c, D/A Only when the distance signal c is in H level so that OUT may show, a D/A conversion count is started, and this counted value will be held if the distance signal c is set to L level. However, if the following pulse signal a comes close, since the counter of a D/A converter will be reset, it recounts from 0 again, a count is continued for the distance signal c between H level, if the distance signal c is set to L level, the counted value is held, and it is repeated similarly hereafter. Namely, D/A of drawing 4 The part shown by the thick wire in the wave of OUT is expressed as change of the voltage level proportional to the time amount width of face T of the distance signal c.

[0009] Moreover, it is not theoretically generated in process of a count, and the dip wave in the middle of this D/A conversion count (part shown by upward arrow-head ** in D/A OUT of drawing 4) does not show the actual distance L. Since it becomes impossible to treat as a signal which continued when the part shown by upward arrow-head ** was deleted, the analog level in front of that is made to hold into a upward arrow-head ** part, and it considers as a continuous ringing (refer to drawing 4 e). If this continuous ringing is made the false continuous ringing e (eF, eR), in a control circuit 6,

processing which acquires that false continuous ringing e first will be performed.
[0010] The above actuation is common about the signal sent from the ultrasonic sensors 1F and 1R of before an automobile and the back end section, and the false continuous ringings eF and eR before an automobile and about the back end section are acquired through such actuation. this time (setting to t at a certain event) the object for the front end sections -- electrical-potential-difference value [of the false continuous ringing eF of ultrasonic sensor 1F]: -- VF (t) electrical-potential-difference value [of the false continuous ringing eR of ultrasonic sensor 1R for the back end sections]: -- VR (t)
Distance between ultrasonic sensor 1 F and the road surfaces G for the front end sections : LF (=VF(t) -k)
Ultrasonic sensor 1R for the back end sections, and distance between road surfaces G : LR (= VR(t) -k)
Proportionality constant : k Distance between ultrasonic sensor 1F and 1R order:l Car-body dip : If theta (t) tantheta(t) =(LF-LR)/l = {k (VF(t)-VR (t))} /l -- (1)
If referred to as a next door and K= 1 tantheta (t) =(VF(t)-VR (t))/l -- (2)
**********. Since the range of theta (t) is -3 degree<theta(t) <3 degree as a matter of fact at this time, they are (2) types. K'theta (t) **(VF(t)-VR (t))/l
(k' is a proportionality constant)
theta (t) **(1/k') x {(VF(t)-VR (t)) /l} -- (3)
It can regard.
[0011] on the other hand -- a control circuit 6 -- a headlight -- the position signal (electrical potential difference) Vs of the current output shaft of the optical-axis driving gear 9 has returned from the position sensor 8. the time of a control circuit 6 comparing theta (t) by this electrical potential difference Vs and the above-shown (3) type, and having the relation of theta(t) <Vs or theta (t)> Vs -- the actuation circuit 7 -- a signal -- outputting -- a headlight -- the headlight which drove the optical-axis driving gear 9 and was produced by dip of the automobile to a road surface G -- modification actuation of whenever [optical axial angle] is carried out in the direction which negates the inclination of an optical axis. it means that it is in whenever [proper optical axial angle] at the time of theta(t) =Vs, and the signal g to the actuation circuit 7 is outputted -- not having -- a headlight -- the optical-axis driving gear 9 is not driven. Moreover, the signal a to a timing circuit 5 is not outputted.
[0012] It explains in more detail about a receiving circuit 3 and a control circuit 6 here. Drawing 5 is the circuit diagram showing the detail of a receiving circuit 3, is set to this drawing 5 , and, for amplifier and 31c, half-wave rectification and a smoothing circuit, and 31d are [31a and 31b] a flip-flop circuit and D/A. IN is a D/A-converter input and S/H. IN is a sample hold selection input and others are the same as that of drawing 3 . In addition, at drawing 5 , it is a subscript. F is omitted. Moreover, the following actuation is common about the signal sent from the ultrasonic sensors 1F and 1R of before and the back end section. Drawing 6 is each part signal waveform diagram in drawing 5 .
[0013] Usually, the received signal can acquire the distance signal c through actuation as shown in each part signal wave form of Section A among drawing 6 in the receiving circuit 3 shown in drawing 5 . Thus, a problem will not be produced, if the signal (signal of the magnitude which deserves amplifying in the latter part and using) of always sufficient magnitude has inputted as shown in the input-signal p wave of the section A in drawing 6 . However, the pulse which the signal strength of this input signal p is sharply changed at the time of real vehicle loading, and especially this may make it feeble remarkably, consequently shows distance L to a distance signal c wave may not occur.
[0014] This situation is shown at the section B of drawing 6 . An input-signal p part with feeble I and RO are distance signal c parts without the pulse which shows distance L during the section B of drawing 6 . According to this, it will be regarded as distance =0 also in a D/A conversion stage (refer to D/A OUT signal partial Ha in Section B), and the level which was mistaken about Section Ba also in the false continuous ringing e will be held. When the amplitude of an input signal p becomes extremely small, the level which is different from the actual condition in the false continuous ringing e will arise, control will progress with the mistaken value, and it becomes impossible that is, to realize proper optical-axis adjustment as the result.

[0015]
[Problem(s) to be Solved by the Invention] As mentioned above, since the acoustic feature of the road surface G which is the measuring object-ed is variously miscellaneous when carrying out range measurement using a supersonic wave although the technique of carrying out range measurement using a supersonic wave from the former, and detecting the inclination of the optical axis of a headlight is known, it does not restrict that the acoustic wave of fixed reinforcement always reflects from a road surface G, but there is often a case where the reinforcement of the reflected wave is changed. Moreover, the same is not always said of the acoustic feature of the road surface G which counters each ultrasonic sensor 1 of before the automobile under halt, and the back end section. for this reason, the incorrect measurement which cannot always perform exact range measurement during a halt during transit, and originates in a feeble reflected wave especially -- being generated -- easy -- a proper headlight -- it becomes impossible to have performed optical axial angle adjustment, and there was a trouble that the safety of transit and smooth nature were spoiled.
[0016] even if, as for the object of this invention, the reinforcement of a reflected wave becomes feeble temporarily -- a proper headlight -- the object for automobiles which is made although optical axial angle adjustment is maintained, and can realize much more safe and smooth transit -- a headlight -- it is in offering an optical-axis adjusting device.
[0017]
[Means for Solving the Problem] The above-mentioned object detects the reflected wave respectively for every ultrasonic discharge with each ultrasonic sensor while firing a predetermined pulse-like supersonic wave from the ultrasonic sensor which countered the road surface and was respectively formed in the before [an automobile] and back end section side. In an optical-axis adjusting device an include angle [as opposed to the road surface of said automobile based on each time of concentration to each ultrasonic sensor of each of that reflected wave] -- calculating -- the result of an operation -- responding -- the headlight of said automobile -- the object for automobiles which controls whenever [optical axial angle] and obtains whenever [proper optical axial angle] -- a headlight -- When the reflected wave detected with said ultrasonic sensor becomes below the reinforcement set up beforehand It is attained by preparing the signal holding circuit to which an include-angle operation of as opposed to the road surface of said automobile as the reflected wave according the reflected wave by the ultrasonic discharge in front of that to the ultrasonic discharge in that case is made to perform using the time of concentration to the ultrasonic sensor of Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne.
[0018]
[Function] every ultrasonic discharge -- a reflected wave -- detecting -- each time of concentration to the ultrasonic sensor of each of that reflected wave -- being based -- an include-angle operation -- carrying out -- a headlight -- the case where whenever [optical axial angle] is controlled -- normal reflected wave detection -- on the way, if it comes out and there is a remarkable feeble reflected wave Control, such as changing the controlled variable of control sharply whenever [optical axial angle], and changing a controlled variable sharply again, if normal reflected wave detection is performed after that, is unstable. the time of concentration to an ultrasonic sensor is not measured in that case -- ******** -- a headlight -- incorrect measurement -- being generated -- easy -- a proper headlight -- optical axial angle adjustment is not performed.
[0019] A signal holding circuit makes an include-angle operation of as opposed to the road surface of an automobile as the reflected wave according the reflected wave by the ultrasonic discharge in front of that to the ultrasonic discharge in that case perform using the time of concentration to the ultrasonic sensor of Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne., when the reflected wave detected with the ultrasonic sensor becomes below the reinforcement set up beforehand (i.e., when there is a feeble reflected wave remarkable as mentioned above). Therefore, it is lost that control, such as changing a controlled variable sharply, becomes instability, and incorrect measurement is lost. namely, -- even if the reinforcement of a reflected wave becomes feeble temporarily -- a proper headlight -- optical axial angle adjustment will be maintained and much more safe and smooth transit will be realized.

[0020]
[Example] Hereafter, the example of this invention is explained with reference to a drawing. the object for automobiles according [drawing 1] to this invention -- a headlight -- it is the circuit diagram showing the important section of one example of an optical-axis adjusting device. The comparator as which, as for 31e, a constant voltage Vo is inputted into + input edge, and Signal s is inputted into - input edge in this drawing 1 , An inverter 31f output signal (reversal signal of Signal c) the inverter which reverses 31f of signals c, and 31g at one input edge They are the AND circuit with which the output signal v of comparator 31e is respectively inputted into the input edge of another side, and the flip-flop circuit which makes an input signal 31h the output signal w of 31g of AND circuits and pulse signal (trigger pulse) a. These constitute signal holding circuit 3A which operates a control circuit 6 so that the level of the signal e by the ultrasonic discharge in front of that may be held as level of the signal e by the ultrasonic discharge in that case, when an input signal p becomes below the reinforcement set up beforehand. In addition, a constant voltage Vo is the threshold voltage of whether to process as an effective input signal p, and partial pressure resistance for R1 and R2 to set up the constant voltage Vo and R3 are pull-up resistors. Others are the same as that of drawing 5 . Moreover, it sets to drawing 1 and is a subscript. It is the same as that of drawing 5 to have omitted F. Furthermore, the fundamental configuration of the whole this invention equipment is the same as that of drawing 3 .

[0021] That is, this invention equipment adds and constitutes signal holding circuit 3A in the receiving circuit 3 which shows the receiving circuit 3 to drawing 5 , and although considered as a D/A-converter input (D/A IN) like the receiving circuit 3 which shows Signal c to drawing 5 , as a sample hold selection input (S/H IN), the output signal x of the above-mentioned signal holding circuit 3A is given.

[0022] Drawing 2 is each part signal waveform diagram in drawing 1 . It sets to this drawing 2 and is D/A. Although OUT and e are not directly shown in drawing 1 , they are the D/A conversion count output signal and false continuous ringing in a control circuit 6, and are the same as that of drawing 4 and drawing 6 .

[0023] Next, although actuation of the above-mentioned this invention equipment is explained When an input signal p is the signal strength which can be processed also in equipment conventionally Since it is the same actuation as each part signal wave form in the section A in drawing 2 and each part signal wave form in the section A in drawing 6 are contrasted and are known, the explanation is omitted, a reflected wave is very feeble, and the actuation in the case of it being remarkable and being feeble is explained below, so that an input signal p cannot process in equipment conventionally.

[0024] The signal strength of an input signal p shows each part signal wave form in the case of it being remarkable as mentioned above and being feeble at the section B of drawing 2 . An input-signal p part with feeble I and RO are distance signal c parts without the pulse which shows distance during the section B of drawing 2 . According to this, it is regarded as distance =0 also in a D/A conversion stage (refer to D/A OUT signal partial Ha in Section B). For this reason, the level conventionally mistaken by equipment also in the false continuous ringing e has been held (refer to section Ba of drawing 6).

[0025] In this invention equipment, when it becomes below the reinforcement to which the input signal p was beforehand set by signal holding circuit 3A, the sample hold circuit in a control circuit 6 (not shown) is operated so that the level of the signal e by the ultrasonic discharge in front of that may be held as level of the signal e in that case. That is, if it becomes an input signal p and below the constant voltage Vo corresponding to the reinforcement to which the rectification output signal s in a receiving circuit 3 was beforehand set when putting in another way, the output signal v of comparator 31e will be set to H level. At this time, since the output signal (distance signal) c of 31d of flip-flop circuits is in L level, an inverter 31f output signal (reversal signal of Signal c) has it in H level, therefore the output signal w of 31g of AND circuits is in H level.

[0026] the time of the output signal w of 31h of flip-flop circuits being H level -- the selection signal x of a hold -- said -- when w is L level, the selection signal x of a sample is given to the sample hold circuit in a control circuit 6 as a sample hold selection input (S/H IN). According to this, even if so remarkably feeble [a reflected wave is very feeble, and] that an input signal p cannot process in equipment conventionally, the level (level of the

signal e by the last ultrasonic discharge) of the signal e in front of the section B (the last section of Section A) is held as level of the signal e by the ultrasonic discharge in that case (refer to section Bb). therefore, the thing which Signal e becomes an unusual value like equipment before -- there is nothing -- malfunction of optical-axis adjustment -- the minimum -- stopping -- a proper headlight -- optical axial angle adjustment is maintained. The above actuation is common about the signal sent from the ultrasonic sensors 1F and 1R of before and the back end section.
[0027] In addition, although the above-mentioned example explained the case where changed into an analog value the width of face T of the distance signal c sent from a receiving circuit 3, and a sample hold circuit was made to memorize a conversion result, the width of face T of the distance signal c is changed into digital value, and you may make it memorize a conversion result in memory etc. According to this, it is useful to digital circuit-ization of a control circuit 6.
[0028] Moreover, although it is premised on attaching the ultrasonic sensors 1F and 1R of before and the back end section in the same height in the above-mentioned example (it is a premise about an above-shown (1) - (3) type having Sensors 1F and 1R in the same height), you may attach in height which is not limited only to this and is different. In this case, what is necessary is just to carry out height amendment of ultrasonic sensors 1F and 1R, for example in the operation in a control circuit 6. According to this, at the time of mounting of ultrasonic sensors 1F and 1R, it becomes unnecessary to carry out height doubling, and mounting becomes easy. Generally, anchoring of ultrasonic sensors 1F and 1R is possible, without ultrasonic sensor 1R for the back end sections countering a road surface G respectively as for ultrasonic sensor 1F for the front end sections, and they being attached in the before bumper lower part at the after bumper lower part, and carrying out height doubling in this case, since a before bumper and an after bumper are the same height mostly.
[0029]
[Effect of the Invention] As explained above, when the reflected wave detected with the ultrasonic sensor becomes below the reinforcement set up beforehand according to this invention Since the signal holding circuit to which an include-angle operation of as opposed to the road surface of an automobile as the reflected wave according the reflected wave by the ultrasonic discharge in front of that to the ultrasonic discharge in that case is made to perform using the time of concentration to the ultrasonic sensor of Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. was prepared even if the reinforcement of a reflected wave becomes feeble temporarily -- a proper headlight -- it can do, although optical axial angle adjustment is maintained, and it is effective in much more safe and smooth transit being realizable.

[Translation done.]

* NOTICES *

TECHNICAL FIELD

[Industrial Application] the object for automobiles using the range measurement according [this invention] to a supersonic wave -- a headlight -- it is related with amelioration of an optical-axis adjusting device.

[Translation done.]

PRIOR ART

[Description of the Prior Art] The include angle to the road surface of an automobile changes in connection with the manpower which takes the automobile, amount or those distribution conditions of the load to load, etc., and, thereby, the optical axis of a headlight also changes. This of not knowing being carried out, and the oncoming car being dazzled with the headlight of a self-vehicle, or it meaning that a headlight may be suitable too much caudad, therefore being able to carry out regulating automatically of the optical axis of a headlight proper is very useful to safety reservation of a self-vehicle and an oncoming car.
[0003] then, the object for automobiles which carries out regulating automatically of the optical axis of a headlight -- a headlight -- although the optical-axis adjusting device is invented variously, as an approach of asking for the include angle to the road surface of an automobile, i.e., the inclination of the optical axis of a headlight, in this case, a distance robot is prepared before an automobile and in the back end section, distance with a road surface is measured in each part, and there is a method of asking for an inclination based on those values. By this approach, the echo from the road surface of the medium for measurement discharged from the predetermined location of before an automobile and the back end section (transmission) is usually detected, and range measurement is performed. Although there is light, an electric wave, or a supersonic wave as a medium used for range measurement, it is difficult light on actual for range measurement to become impossible with the dirt of a luminescence side or a light-receiving side, or to assume a road surface to be a light reflex side, and an electric wave is [incorrect-] easy to be measured in response to the effect of external noise. From this, a supersonic wave is suitable and carries out range measurement using a supersonic wave actually, it asks for the inclination of the optical axis of a headlight, and some techniques which carry out optical-axis adjustment are considered.
[0004] Drawing 3 is the block diagram showing the example. The ultrasonic sensor with which 1 consists of an ultrasonic vibrator of the object for transmission, and the couple for reception etc. in this drawing 3 , The sending circuit which 2 gives [sending circuit] the pulse-like high-tension signal b to an ultrasonic sensor 1, and fires a predetermined pulse-like supersonic wave from the ultrasonic sensor 1 (transmission), The receiving circuit which amplifies and operates orthopedically the signal by which 3 was received with the ultrasonic sensor 1, and 4 are the selection circuitries for being prepared between an ultrasonic sensor 1 and a receiving circuit 3, and not telling the signal b from a sending circuit 2 to a receiving circuit 3. 5 is a timing circuit and 6 is a control circuit. Here, a timing circuit 5 sets up the transmit frequencies f and the air time tau of a supersonic wave, is started by pulse signal (trigger pulse) a from a control circuit 6, and drives a sending circuit 2, and transmits pulse signal a from a control circuit 6 to a receiving circuit 3. A control circuit 6 calculates by considering the signal c from a receiving circuit 3, and the signal Vs from the below-mentioned position sensor as an input, and according to the result of an operation, Signal a is outputted to a timing circuit 5, and it outputs Signal g to the below-mentioned

actuation circuit respectively. 7 -- the signal g from a control circuit 6 -- a headlight -- the actuation circuit for driving the optical-axis driving gear 9, and 8 -- a headlight -- it is the position sensor which detects the location of the output shaft of the optical-axis driving gear 9, and returns the detecting signal Vs to a control circuit 6.

[0005] Here, although said sending circuit 2, a receiving circuit 3, a selection circuitry 4, and a timing circuit 5 constitute the ultrasonic transceiver circuit 11, one pair of of this ultrasonic transceiver circuit 11 and said ultrasonic sensor 1 is prepared respectively, among those, the object for the front end sections of an automobile (not shown) and others are the same, and 1 set (what has given subscript R to the sign) of 1 set (what has given subscript F to the sign) is an object for the back end sections. It is attached in the condition that ultrasonic sensor 1R for the back end sections made ultrasonic sensor 1F for the front end sections counter a road surface G respectively at the automobile back end section, for example, the after bumper lower part, at the automobile front end section, for example, the before bumper lower part.

[0006] such an object for automobiles -- a headlight -- in an optical-axis adjusting device, a control circuit 6 outputs pulse signal a (aF, aR) which takes the timing of ultrasonic transmission and reception, and starts a timing circuit 5 (5F, 5R). A sending circuit 2 (2F, 2R) generates the high-tension signal b (bF, bR) which excites fixed time amount tau and an ultrasonic sensor 1 (1F, 1R) synchronizing with the start of pulse signal a. The vibration frequency f to excite is arbitrary.

[0007] It is reflected on a road surface G and the supersonic wave discharged from the ultrasonic sensor 1 returns to an ultrasonic sensor 1 again after T seconds. The input signal o (oF, oR) passes a selection circuitry 4 (4F, 4R), and reaches a receiving circuit 3 (3F, 3R). In addition, as for the high-tension signal b to a sending circuit 2, the enter lump by the receiving circuit 3 is prevented by this selection circuitry 4. Magnification / plastic surgery processing is carried out in a receiving circuit 3, and the input signal p (pF, pR) which arrived at the receiving circuit 3 is outputted as a distance signal c (cF, cR) with which the time amount width of face T changes according to distance L (LF, LR), and is sent to a control circuit 6. The time relation of Signals a, b, and c in this case is as being shown in drawing 4 a, b, and c.

[0008] A control circuit 6 receives the distance signal c sent from a receiving circuit 3, and changes it into the digital value or the analog value according to the width of face T. Although a conversion result is memorized in memory or a sample hold circuit, it shall change into an analog value here and shall memorize in a sample hold circuit. That is, a D/A conversion count which changes a voltage level with the width of face T of the distance signal c is performed here (refer to drawing 4 D/A OUT). Drawing 4 c, D/A Only when the distance signal c is in H level so that OUT may show, a D/A conversion count is started, and this counted value will be held if the distance signal c is set to L level. However, if the following pulse signal a comes close, since the counter of a D/A converter will be reset, it recounts from 0 again, a count is continued for the distance signal c between H level, if the distance signal c is set to L level, the counted value is held, and it is repeated similarly hereafter. Namely, D/A of drawing 4 The part shown by the thick wire in the wave of OUT is expressed as change of the voltage level proportional to the time amount width of face T of the distance signal c.

[0009] Moreover, it is not theoretically generated in process of a count, and the dip wave in the middle of this D/A conversion count (part shown by upward arrow-head ** in D/A OUT of drawing 4) does not show the actual distance L. Since it becomes impossible to treat as a signal which continued when the part shown by upward arrow-head ** was deleted, the analog level in front of that is made to hold into a upward arrow-head ** part, and it considers as a continuous ringing (refer to drawing 4 e). If this continuous ringing is made the false continuous ringing e (eF, eR), in a control circuit 6, processing which acquires that false continuous ringing e first will be performed.

[0010] The above actuation is common about the signal sent from the ultrasonic sensors 1F and 1R of before an automobile and the back end section, and the false continuous ringings eF and eR before an automobile and about the back end section are acquired through such actuation. this time (setting to t at a certain event) the object for the front end sections -- electrical-potential-difference value [of the false continuous ringing eF of ultrasonic sensor 1F]: -- VF (t) electrical-potential-difference value [of the false continuous ringing eR of ultrasonic sensor 1R for the back end sections]: -- VR (t)

Distance between ultrasonic sensor 1 F and the road surfaces G for the front end sections : LF (=VF(t) -k)
Ultrasonic sensor 1R for the back end sections, and distance between road surfaces G : LR (= VR(t) -k)
Proportionality constant : k Distance between ultrasonic sensor 1F and 1R order:l Car-body dip : If theta (t) tantheta(t) =(LF-LR)/l = {k (VF(t)-VR (t))} /l -- (1)
If referred to as a next door and K= 1 tantheta (t) =(VF(t)-VR (t))/l -- (2)
**********. Since the range of theta (t) is -3 degree<theta(t) <3 degree as a matter of fact at this time, they are (2) types. K'theta (t) **(VF(t)-VR (t))/l (k' is a proportionality constant)
theta (t) **(1/k') x {(VF(t)-VR (t)) /l} -- (3)
It can regard.
[0011] on the other hand -- a control circuit 6 -- a headlight -- the position signal (electrical potential difference) Vs of the current output shaft of the optical-axis driving gear 9 has returned from the position sensor 8. the time of a control circuit 6 comparing theta (t) by this electrical potential difference Vs and the above-shown (3) type, and having the relation of theta(t) <Vs or theta (t)> Vs -- the actuation circuit 7 -- a signal -- outputting -- a headlight -- the headlight which drove the optical-axis driving gear 9 and was produced by dip of the automobile to a road surface G -- modification actuation of whenever [optical axial angle] is carried out in the direction which negates the inclination of an optical axis. it means that it is in whenever [proper optical axial angle] at the time of theta(t) =Vs, and the signal g to the actuation circuit 7 is outputted -- not having -- a headlight -- the optical-axis driving gear 9 is not driven. Moreover, the signal a to a timing circuit 5 is not outputted.
[0012] It explains in more detail about a receiving circuit 3 and a control circuit 6 here. Drawing 5 is the circuit diagram showing the detail of a receiving circuit 3, is set to this drawing 5 , and, for amplifier and 31c, half-wave rectification and a smoothing circuit, and 31d are [31a and 31b] a flip-flop circuit and D/A. IN is a D/A-converter input and S/H. IN is a sample hold selection input and others are the same as that of drawing 3 . In addition, at drawing 5 , it is a subscript. F is omitted. Moreover, the following actuation is common about the signal sent from the ultrasonic sensors 1F and 1R of before and the back end section. Drawing 6 is each part signal waveform diagram in drawing 5 .
[0013] Usually, the received signal can acquire the distance signal c through actuation as shown in each part signal wave form of Section A among drawing 6 in the receiving circuit 3 shown in drawing 5 . Thus, a problem will not be produced, if the signal (signal of the magnitude which deserves amplifying in the latter part and using) of always sufficient magnitude has inputted as shown in the input-signal p wave of the section A in drawing 6 . However, the pulse which the signal strength of this input signal p is sharply changed at the time of real vehicle loading, and especially this may make it feeble remarkably, consequently shows distance L to a distance signal c wave may not occur.
[0014] This situation is shown at the section B of drawing 6 . An input-signal p part with feeble I and RO are distance signal c parts without the pulse which shows distance L during the section B of drawing 6 . According to this, it will be regarded as distance =0 also in a D/A conversion stage (refer to D/A OUT signal partial Ha in Section B), and the level which was mistaken about Section Ba also in the false continuous ringing e will be held. When the amplitude of an input signal p becomes extremely small, the level which is different from the actual condition in the false continuous ringing e will arise, control will progress with the mistaken value, and it becomes impossible that is, to realize proper optical-axis adjustment as the result.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, when the reflected wave detected with the ultrasonic sensor became below the reinforcement set up beforehand in this invention, the signal holding circuit to which an include-angle operation of as opposed to the road surface of an automobile as the reflected wave according the reflected wave by the ultrasonic discharge in front of that to the ultrasonic discharge in that case is made to perform using the time of concentration to the ultrasonic sensor of Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. was prepared. therefore -- even if the reinforcement of a reflected wave becomes feeble temporarily -- a proper headlight -- it can do, although optical axial angle adjustment is maintained, and it is effective in much more safe and smooth transit being realizable.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] As mentioned above, since the acoustic feature of the road surface G which is the measuring object-ed is variously miscellaneous when carrying out range measurement using a supersonic wave although the technique of carrying out range measurement using a supersonic wave from the former, and detecting the inclination of the optical axis of a headlight is known, it does not restrict that the acoustic wave of fixed reinforcement always reflects from a road surface G, but there is often a case where the reinforcement of the reflected wave is changed. Moreover, the same is not always said of the acoustic feature of the road surface G which counters each ultrasonic sensor 1 of before the automobile under halt, and the back end section. for this reason, the incorrect measurement which cannot always perform exact range measurement during a halt during transit, and originates in a feeble reflected wave especially -- being generated -- easy -- a proper headlight -- it becomes impossible to have performed optical axial angle adjustment, and there was a trouble that the safety of transit and smooth nature were spoiled.
[0016] even if, as for the object of this invention, the reinforcement of a reflected wave becomes feeble temporarily -- a proper headlight -- the object for automobiles which is made although optical axial angle adjustment is maintained, and can realize much more safe and smooth transit -- a headlight -- it is in offering an optical-axis adjusting device.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] The above-mentioned object detects the reflected wave respectively for every ultrasonic discharge with each ultrasonic sensor while firing a predetermined pulse-like supersonic wave from the ultrasonic sensor which countered the road surface and was respectively formed in the before [an automobile] and back end section side. In an optical-axis adjusting device an include angle [as opposed to the road surface of said automobile based on each time of concentration to each ultrasonic sensor of each of that reflected wave] -- calculating -- the result of an operation --- responding -- the headlight of said automobile -- the object for automobiles which controls whenever [optical axial angle] and obtains whenever [proper optical axial angle] -- a headlight -- When the reflected wave detected with said ultrasonic sensor becomes below the reinforcement set up beforehand It is attained by preparing the signal holding circuit to which an include-angle operation of as opposed to the road surface of said automobile as the reflected wave according the reflected wave by the ultrasonic discharge in front of that to the ultrasonic discharge in that case is made to perform using the time of concentration to the ultrasonic sensor of Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne.

[Translation done.]

OPERATION

[Function] every ultrasonic discharge -- a reflected wave -- detecting -- each time of concentration to the ultrasonic sensor of each of that reflected wave -- being based -- an include-angle operation -- carrying out -- a headlight -- the case where whenever [optical axial angle] is controlled -- normal reflected wave detection -- on the way -- if it comes out and there is a remarkable feeble reflected wave the time of concentration to an ultrasonic sensor is not measured in that case -- ******** -- a headlight -- control, such as changing the controlled variable of control sharply whenever [optical axial angle], and changing a controlled variable sharply again, if normal reflected wave detection is performed after that, -- unstable -- incorrect measurement measurement -- being generated -- easy -- a proper headlight -- optical axial angle adjustment is not performed.
[0019] A signal holding circuit makes an include-angle operation of as opposed to the road surface of an automobile as the reflected wave according the reflected wave by the ultrasonic discharge in front of that to the ultrasonic discharge in that case perform using the time of concentration to the ultrasonic sensor of Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne., when the reflected wave detected with the ultrasonic sensor becomes below the reinforcement set up beforehand (i.e., when there is a feeble reflected wave remarkable as mentioned above). Therefore, it is lost that control, such as changing a controlled variable sharply, becomes instability, and incorrect measurement is lost. namely, -- even if the reinforcement of a reflected wave becomes feeble temporarily -- a proper headlight -- optical axial angle adjustment will be maintained and much more safe and smooth transit will be realized.

[Translation done.]

EXAMPLE

[Example] Hereafter, the example of this invention is explained with reference to a drawing. the object for automobiles according [drawing 1] to this invention -- a headlight -- it is the circuit diagram showing the important section of one example of an optical-axis adjusting device. The comparator as which, as for 31e, a constant voltage Vo is inputted into + input edge, and Signal s is inputted into - input edge in this drawing 1 , An inverter 31f output signal (reversal signal of Signal c) the inverter which reverses 31f of signals c, and 31g at one input edge They are the AND circuit with which the output signal v of comparator 31e is respectively inputted into the input edge of another side, and the flip-flop circuit which makes an input signal 31h the output signal w of 31g of AND circuits and pulse signal (trigger pulse) a. These constitute signal holding circuit 3A which operates a control circuit 6 so that the level of the signal e by the ultrasonic discharge in front of that may be held as level of the signal e by the ultrasonic discharge in that case, when an input signal p becomes below the reinforcement set up beforehand. In addition, a constant voltage Vo is the threshold voltage of whether to process as an effective input signal p, and partial pressure resistance for R1 and R2 to set up the constant voltage Vo and R3 are pull-up resistors. Others are the same as that of drawing 5 . Moreover, it sets to drawing 1 and is a subscript. It is the same as that of drawing 5 to have omitted F. Furthermore, the fundamental configuration of the whole this invention equipment is the same as that of drawing 3 .
[0021] That is, this invention equipment adds and constitutes signal holding circuit 3A in the receiving circuit 3 which shows the receiving circuit 3 to drawing 5 , and although considered as a D/A-converter input (D/A IN) like the receiving circuit 3 which shows Signal c to drawing 5 , as a sample hold selection input (S/H IN), the output signal x of the above-mentioned signal holding circuit 3A is given.
[0022] Drawing 2 is each part signal waveform diagram in drawing 1 . It sets to this drawing 2 and is D/A. Although OUT and e are not directly shown in drawing 1 , they are the D/A conversion count output signal and false continuous ringing in a control circuit 6, and are the same as that of drawing 4 and drawing 6 .
[0023] Next, although actuation of the above-mentioned this invention equipment is explained When an input signal p is the signal strength which can be processed also in equipment conventionally Since it is the same actuation as each part signal wave form in the section A in drawing 2 and each part signal wave form in the section A in drawing 6 are contrasted and are known, the explanation is omitted, a reflected wave is very feeble, and the actuation in the case of it being remarkable and being feeble is explained below, so that an input signal p cannot process in equipment conventionally.
[0024] The signal strength of an input signal p shows each part signal wave form in the case of it being remarkable as mentioned above and being feeble at the section B of drawing 2 . An input-signal p part with feeble I and RO are distance signal c parts without the pulse which shows distance during the section B of drawing 2 . According to this, it is regarded as distance =0 also in a D/A conversion stage (refer to D/A OUT signal partial Ha in Section

B). For this reason, the level conventionally mistaken by equipment also in the false continuous ringing e has been held (refer to section Ba of drawing 6).

[0025] In this invention equipment, when it becomes below the reinforcement to which the input signal p was beforehand set by signal holding circuit 3A, the sample hold circuit in a control circuit 6 (not shown) is operated so that the level of the signal e by the ultrasonic discharge in front of that may be held as level of the signal e in that case. That is, if it becomes an input signal p and below the constant voltage Vo corresponding to the reinforcement to which the rectification output signal s in a receiving circuit 3 was beforehand set when putting in another way, the output signal v of comparator 31e will be set to H level. At this time, since the output signal (distance signal) c of 31d of flip-flop circuits is in L level, an inverter 31f output signal (reversal signal of Signal c) has it in H level, therefore the output signal w of 31g of AND circuits is in H level.

[0026] the time of the output signal w of 31h of flip-flop circuits being H level -- the selection signal x of a hold -- said -- when w is L level, the selection signal x of a sample is given to the sample hold circuit in a control circuit 6 as a sample hold selection input (S/H IN). According to this, even if so remarkably feeble [a reflected wave is very feeble, and] that an input signal p cannot process in equipment conventionally, the level (level of the signal e by the last ultrasonic discharge) of the signal e in front of the section B (the last section of Section A) is held as level of the signal e by the ultrasonic discharge in that case (refer to section Bb). therefore, the thing which Signal e becomes an unusual value like equipment before -- there is nothing -- malfunction of optical-axis adjustment -- the minimum -- stopping -- a proper headlight -- optical axial angle adjustment is maintained. The above actuation is common about the signal sent from the ultrasonic sensors 1F and 1R of before and the back end section.

[0027] In addition, although the above-mentioned example explained the case where changed into an analog value the width of face T of the distance signal c sent from a receiving circuit 3, and a sample hold circuit was made to memorize a conversion result, the width of face T of the distance signal c is changed into digital value, and you may make it memorize a conversion result in memory etc. According to this, it is useful to digital circuit-ization of a control circuit 6.

[0028] Moreover, although it is premised on attaching the ultrasonic sensors 1F and 1R of before and the back end section in the same height in the above-mentioned example (it is a premise about an above-shown (1) - (3) type having Sensors 1F and 1R in the same height), you may attach in height which is not limited only to this and is different. In this case, what is necessary is just to carry out height amendment of ultrasonic sensors 1F and 1R, for example in the operation in a control circuit 6. According to this, at the time of mounting of ultrasonic sensors 1F and 1R, it becomes unnecessary to carry out height doubling, and mounting becomes easy. Generally, anchoring of ultrasonic sensors 1F and 1R is possible, without ultrasonic sensor 1R for the back end sections countering a road surface G respectively as for ultrasonic sensor 1F for the front end sections, and they being attached in the before bumper lower part at the after bumper lower part, and carrying out height doubling in this case, since a before bumper and an after bumper are the same height mostly.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the circuit diagram showing the important section of one example of this invention equipment.
[Drawing 2] It is each part signal waveform diagram in drawing 1 .
[Drawing 3] the object for automobiles -- a headlight -- it is the block diagram showing an example of an optical-axis adjusting device.
[Drawing 4] It is a signal waveform diagram for explaining actuation of the equipment shown in drawing 3 .
[Drawing 5] It is the circuit diagram showing the important section of equipment conventionally.
[Drawing 6] It is each part signal waveform diagram in drawing 5 .
[Description of Notations]
1 (1F, 1R) -- An ultrasonic sensor, 2 (2F, 2R) -- A sending circuit, 3 (3F, 3R) -- Receiving circuit, 3A (3AF, 3AR) -- A signal holding circuit, 4 (4F, 4R) -- Selection circuitry, 5 (5F, 5R) -- A timing circuit, 6 -- A control circuit, 7 -- Actuation circuit, 8 -- position sensor and 9 -- a headlight -- an optical-axis driving gear and 11 (11F, 11R) -- supersonic-wave transceiver circuit -- G -- A road surface, L -- The distance from an ultrasonic sensor to a road surface, a -- Pulse signal (trigger pulse), b-- a high-tension signal, c-- receiving-circuit output signal (distance signal), the signal (actuation circuit control signal) from g-- control circuit, and Vs-- a headlight -- the output-shaft location detecting signal of an optical-axis driving gear, o-- selection-circuitry input signal, and p-- input signal.

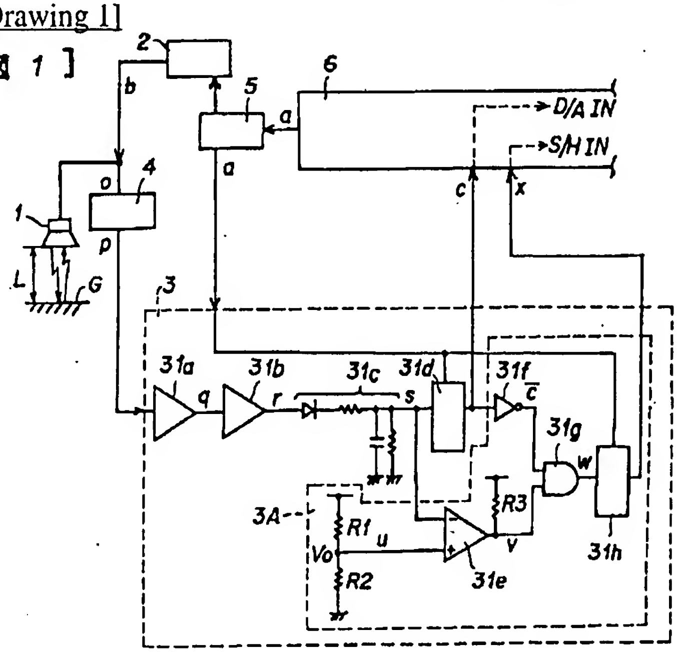
[Translation done.]

* NOTICES *

DRAWINGS

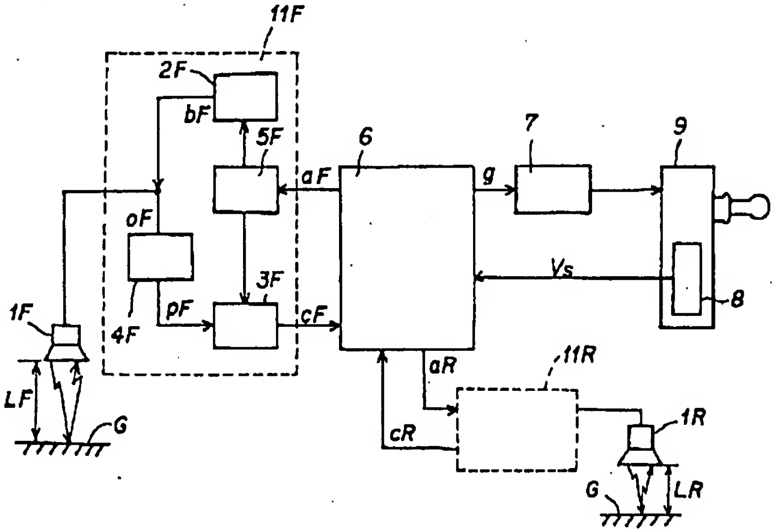
[Drawing 1]

【図 1】



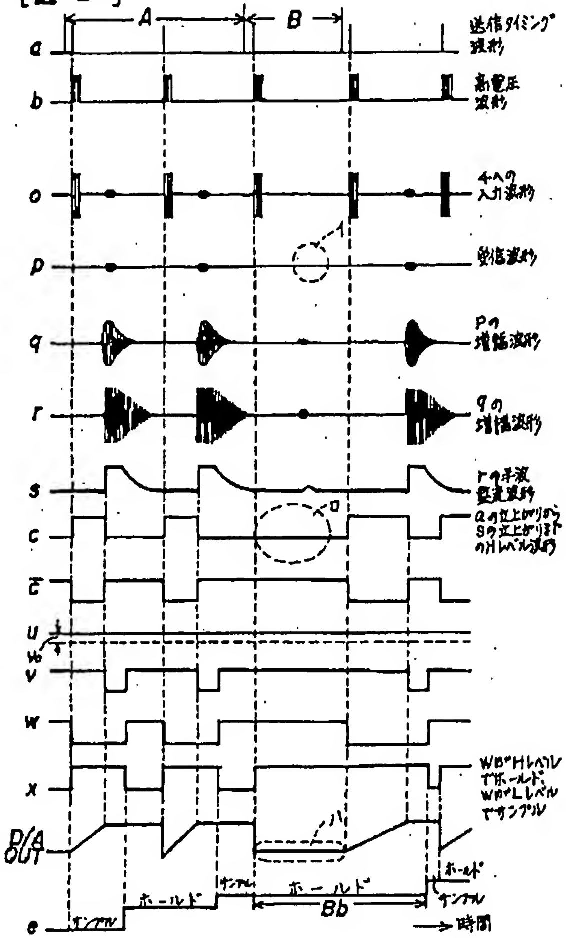
[Drawing 3]

[図 3]



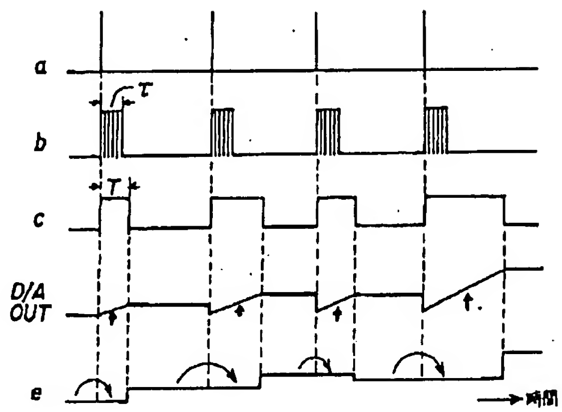
[Drawing 2]

[図 2]


A
B
a
b
o
p
q
r
s
c
u
v
w
x
D/A OUT
e
送信タイミング波形
高電圧波形
4への入力波形
受信波形
pの増幅波形
qの増幅波形
rの検波整流波形
aの立上がりからsの立上がりまでのHレベル波形
WがHレベルでホールド、WがLレベルでサンプル
イ
ロ
ハ
サンプル
ホールド
Bb
→時間

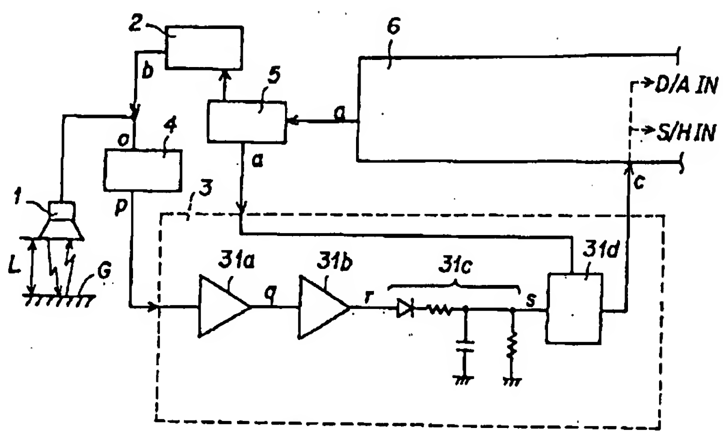
[Drawing 4]

【図 4】



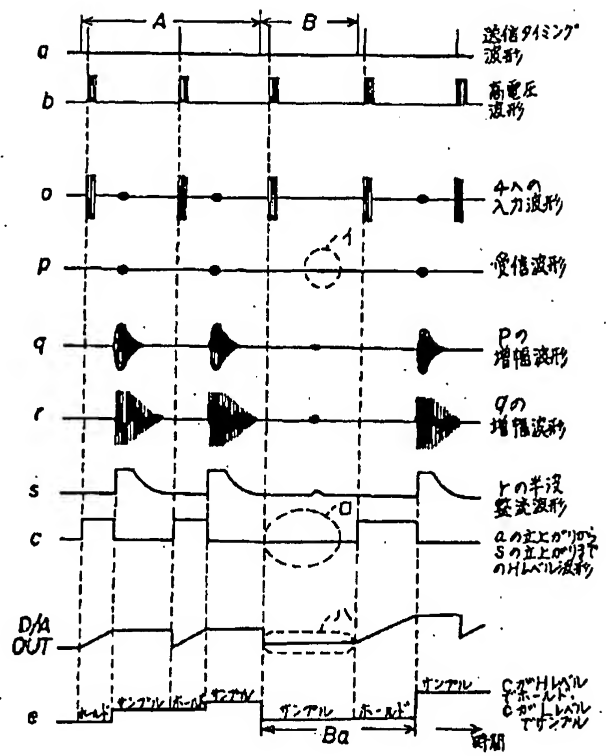
[Drawing 5]

【図 5】



[Drawing 6]

[図 6]



[Translation done.]